**Reflection of Light Summary Sheet**

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| **Law of Reflection**: The incident ray, the reflected ray, and the normal to the surface all lie in the same plane. The angle of reflection Θr is equal to the angle of incidence Θi    Θr = Θi |  |
| **Plane Mirror** | |
| 1. Image is upright. 2. Image is the same size as you are (m = 1) 3. Image is located as far behind the mirror as you are in front of it. 4. The image is reverses left and right. |  |
| A mirror must be at least one half the total height of the person in order for the person to see their entire image.   1. Only the mirror section between B and C is required to view the part of the body below the eyes. 2. Only the mirror section between points C and P (top picture) are required to view the part of the body above the eyes. |  |
| **Spherical Mirrors** | |
| Mirrors can be made in a spherical shape. There are two types of spherical mirrors:   1. **Concave** – the inside of a sphere is polished and the radius of curvature is located on the same side as the reflective surface.  * Radius of curvature = R * Focal length f = ½ R (same side as the mirror)  1. Convex – the outside of a sphere is polished and the radius of curvature is located on the opposite side of the **reflective** surface.  * Radius of curvature = R * Focal length = - ½ R (opposite side of the mirror) |  |
| **Ray Tracing for Concave Mirror**  **Ray 1**: This ray is initially parallel to the principal axis and, therefore, passes through the focal point F after reflection from the mirror.  **Ray 2**: This ray passes through the focal point F and is reflected parallel to the principal axis.  **Ray 3**: This ray travels along a line that passes through the center of curvature C. |  |
| **Ray Tracing for Convex Mirror**  **Ray 1**: This ray is initially parallel to the principal axis and appears to originate from the focal point F after reflection from the mirror  **Ray 2**: This ray heads towards F, emerging parallel to the principal axis after reflection.  **Ray 3**: This ray travels along a line that passes through the center of curvature C. |  |
| **Spherical Mirror Object Positions** | |
| **Object between the focal point F and the center of curvature C**   * **Real image** * **Image Enlarged** * **Image Inverted** |  |
| **Object beyond the center of curvature C**   * **Real image** * **Image Reduced in size** * **Image Inverted** |  |
| **Object between the mirror and the focal length F**   * **Virtual image** * **Image Enlarged** * **Image Upright** |  |
| **Spherical Mirror Equation and Magnification** | |
| **d0 = distance to object hi = Image height**  **di = distance to image ho = Object height**  **f = focal length**  **m = magnification** (+) for upright image  (-) for inverted image | **Focal length**  f is (+) for a concave mirror  f is (-) for a convex mirror  **Object Distance**  do is + if the object is in front of the mirror (real object)  do is - if the object is in back of the mirror (virtual object)  **Image Distance**  di is + if the image is in front of the mirror (real image)  di is - if the image is in back of the mirror (virtual image) |